

**IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF OHIO
EASTERN DIVISION AT COLUMBUS**

IN RE: OHIO EXECUTION
PROTOCOL LITIGATION

: Case No. 2:11-cv-1016

District Judge Edmund A. Sargus, Jr.
: Magistrate Judge Michael R. Merz

This document relates to:

Plaintiffs Cleveland Jackson, James Hanna, :
Kareem Jackson, and Melvin Bonnell

**DECISION AND ORDER DENYING MOTIONS *IN LIMINE* TO
EXCLUDE EXPERT REPORT AND TESTIMONY OF DR. JOSEPH
ANTOGNINI EXPERT REPORTS AND TESTIMONY OF DR. MARK
EDGAR**

This consolidated method of execution case is before the Court on Plaintiff Cleveland Jackson's Motion *in Limine* to Exclude and/or Limit Testimony of Joseph M. Antognini, M.D, an expert witness for Defendants ("Antognini Motion III," ECF No. 2318), and Defendants' Motion *in Limine* to Exclude the Testimony of Plaintiff's Expert Mark A. Edgar, M.D. ("Edgar Motion II," ECF No. 2314).¹ The parties have filed the appropriate memoranda *contra* and replies in support (ECF No. 2344, 2352). The Court heard live testimony from these two proposed experts on September 9-10, 2019, to determine the admissibility of their testimony under Fed.R.Evid. 702 and *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993). For the reasons set forth below,

¹ Subsequent to the Motions, the Court ordered consolidated the preliminary injunction hearings of Plaintiffs Cleveland Jackson, James Hanna, Kareem Jackson, and Melvin Bonnell (Order, ECF No. 2378; Decision and Supp. Memo., ECF No. 2418). Drs. Antognini and Edgar are being offered as experts with respect to the motions for preliminary injunction of Cleveland Jackson (ECF Nos. 2242 and 2437), Hanna (ECF No. 2435), and Bonnell (ECF Nos. 2438).

the Motions *in Limine* are DENIED.

FACTUAL BACKGROUND AND PROCEDURAL HISTORY

Put simply, this is not the Court's first encounter with either Dr. Antognini or Dr. Edgar. Dr. Antognini has testified three times in this consolidated case and Dr. Edgar has testified once in respect of Warren Henness (Hrg. Tr., ECF Nos. 924, 1358, 2113, and 2120). They have submitted eight expert reports (plus supplements and addenda) between them (ECF Nos. 852-1 and 887-1, 1310-1, 1950, 1983 and 1990-1, 1999, 2257, 2291, and 2333). However, their abilities to meet *Daubert* and Rule 702 have been consistently questioned. On October 19, 2017, after Dr. Antognini filed his expert report in anticipation of the preliminary injunction hearing of former Plaintiffs Alva Campbell, Jr., and Raymond Tibbetts (ECF No. 1310-1), Campbell and Tibbetts filed a Motion *in Limine* to Exclude Dr. Antognini's testimony, arguing that he was not qualified to opine on consciousness and pain in humans, and on the sufficiency of consciousness checks performed by execution Team Members on inmates. "Moreover, his views on the analgesic properties of midazolam are not supported by reliable evidence and are contradicted by scientific consensus." (Antognini Motion I, ECF No. 1314, PageID 47829). The Court denied the motion "without prejudice to appropriate objections to particular parts of Dr. Antognini's testimony during the preliminary injunction hearing." (Notation Order, ECF No. 1335). During Antognini's testimony, counsel for Campbell and Tibbetts renewed their objections, stating that his experience with "animal model studies of inhaled anesthetics" made him ill-equipped to opine on "how midazolam effects [sic] consciousness or experience of pain in humans." (Hrg. Tr., ECF No. 1358, PageID 50575). The Court overruled the objection and allowed Dr. Antognini to testify as an

expert in anesthesiology. *Id.* at PageID 50576; *see also In re: Ohio Execution Protocol Litig. (Campbell and Tibbetts)*, No. 2:11-cv-1016, 2017 U.S. Dist. LEXIS 182406 at *42 n.17 (S.D. Ohio Nov. 3, 2017) (Merz, Mag. J.) (discussing decision to allow Dr. Antognini to testify as an expert anesthesiologist).

In anticipation of Plaintiff Warren Henness’s preliminary injunction hearing, both Drs. Edgar and Antognini filed expert reports, and Dr. Edgar filed a rebuttal report that was partially in response to Dr. Antognini’s report of (ECF No. 1999). On November 21, 2018, Defendants filed a Motion *in Limine* to Exclude Plaintiff’s Expert Testimony, including the testimony of Dr. Edgar (“Edgar Motion I,” ECF No. 2027). Therein, they argued that Dr. Edgar’s reports and anticipated testimony could not satisfy *Daubert*, because they are “self-evidently ‘litigation-driven.’” *Id.* at PageID 97268. Defendants also claimed that “the ‘data’ underlying Dr. Edgars’ [sic] opinion – the results of autopsies of executed inmates . . . – has [sic] been derived exclusively for the purposes of litigation.” *Id.* at PageID 97270-71. Finally, they argued that Dr. Edgar’s concession that inmates executed with pentobarbital also suffered from pulmonary edema meant that his testimony would not assist the Court in determining whether Henness could meet the second prong of *Baze v. Rees* and its progeny—showing “a feasible, readily implemented alternative that in fact will significantly reduce a substantial risk of severe pain.” *Id.* at PageID 97272-73, citing 553 U.S. 35, 52 (2008).

That same day, Henness filed a Motion in Limine to Exclude Testimony of Antognini (“Antognini Motion II,” ECF No. 2034). Therein, he argued that Dr. Antognini’s opinions “on the [purported] analgesic properties of midazolam are not supported by reliable evidence and are contradicted by scientific consensus[,]” *id.* at PageID 99614, and his other opinions “on the matters of sensation, consciousness, and pain in humans, as well as ‘consciousness checks’ in Ohio’s

protocol[,]” should be excluded “because they are outside the subject matter of his expertise and do not flow naturally from his research.” *Id.* at PageID 99613, citing Antognini Henness Report, ECF No. 1983. Finally, he argued that Dr. Antognini’s opinion that the State’s protocol allows for sufficient time for the midazolam to induce unconsciousness before the paralytic and potassium chloride are administered are unsupported by any explanation or evidence in his report. *Id.* at PageID 99614, 99615.

The motions became fully briefed on November 30, 2018 (Replies, ECF Nos. 2071-72), only eleven days prior to Henness’s hearing. Consequently, the Court denied the motions but made clear that the parties offering the witnesses must satisfy *Daubert* and Rule 702 at the evidentiary hearing before the Court would consider their testimonies and reports (Orders, ECF No. 2097, PageID 103356; ECF No. 2098, PageID 103359-60). Specifically, the Court concluded that:

It would be premature to determine the relevance, reliability, and validity of Dr. Antognini’s testimony based on his declaration, without cross examination, and without the benefit of the testimony from the several other expert witnesses expected to testify at the hearing. In addition, any inconsistent testimony or statements Dr. Antognini has offered previously are best addressed on cross examination.

(Order, ECF No. 2098, PageID 103360). As discussed above, both Drs. Antognini and Edgar testified in the Henness hearing, and during each of their respective testimonies, the non-offering party objected strongly and consistently as to certain portions of their testimony (*See, e.g.*, Hrg. Trs., ECF No. 2112, PageID 103820, 103838, 103850, 103852, 103871, 103912 (objections to testimony of Dr. Edgar); ECF No. 2114, PageID 104823-41 (counsel for Henness conducting *voir dire* of Dr. Antognini prior to his testimony). The Court overruled Henness’s *Daubert* objection as to Dr. Antognini and evaluated and weighed the respective reports and testimonies of Drs.

Antognini and Edgar under *Daubert* and Rule 702. *In re Ohio Execution Protocol Litig. (Henness)*, No. 2:11-cv-1016, 2019 U.S. Dist. LEXIS 8200, at * 36-38, 51-70, 188-211 (S.D. Ohio Jan. 14, 2019) (Merz, Mag. J.), *aff'd on other grounds Hennes*, 2019 U.S. App. LEXIS 27365 (6th Cir. Sep. 11, 2019).

In anticipation of Cleveland Jackson's preliminary injunction hearing at the end of September, 2019, Dr. Edgar filed his initial and rebuttal expert reports (ECF Nos. 2257, 2333), and on August 20, 2019, after Jackson obtained additional records, filed a supplemental expert report (ECF No. 2380). On July 24, 2019, Dr. Antognini filed his expert report in support of Defendants (ECF No. 2291). The motions *sub judice* were filed on August 7, 2019 (ECF Nos. 2314, 2318).

The Court has decided prior motions *in limine* directed to prior preliminary injunction hearings in this consolidated case on the motion papers, reserving objections for the hearings. However, the Defendants strongly criticized the Court's handling of the scientific evidence in the *Hennes* appeal, labeling it a "democratic approach to science" and "indefensible." Brief of State Appellees, 6th Cir. Case No. 19-3064, ECF No. 33, PageID 34.²

District courts are not obliged to hold an evidentiary hearing to make a *Daubert* determination. *Greenwell v. Boatwright*, 184 F.3d 490 (6th Cir. 1999), and whether to do so is committed to the trial court's discretion. *Kumho Tire Co. v. Carmichael*, 526 U.S.137, 152 (1999); *Nelson v. Tennessee Gas Pipeline Co.*, 243 F.3d 244 (6th Cir. 2001). Applying *Daubert* principles, the Court has already excluded without a hearing the proposed testimony of Steve Yun, M.D., and limited the proposed testimony of Charles Kokes, M.D. (Orders, ECF Nos. 2353, 2355). As to Drs. Antognini and Edgar, the Court has exercised its discretion to require a hearing to more

² The Sixth Circuit's opinion does not comment on this characterization.

thoroughly explore the reliability of their opinions and thus meet the challenge Defendants have made in the *Hennes* appeal.

GRAVAMEN OF CURRENT MOTIONS

A. Motion to Exclude Dr. Antognini

In Antognini Motion III, Jackson argues that proper cross-examination of Dr. Antognini is impossible at this juncture because he “has not yet specifically been provided copies of . . . the autopsy reports on which Dr. Antognini purports to base some of his opinions.” (ECF No. 2318, PageID 112740-41, citing Antognini Report, ECF No. 2291, PageID 111262, 111284-87). Moreover, Jackson claims that Dr. Antognini’s express reliance upon his prior opinions renders his current report and expected testimony unreliable and lacking in foundation, *id.* at PageID 112741-42, citing Antognini Report, ECF No. 2291, PageID 111260, 111263, ¶¶ 4, 11, for the following reasons:

1. “Dr. Antognini rejects analgesia as a component of anesthesia, placing his view at odds with the anesthesia community in this nation” both academically and in practice”;
2. “Dr. Antognini has never written any textbook chapters devoted to midazolam or benzodiazepines[.]” Also, he has not studied the effects of midazolam on consciousness; in fact, benzodiazepines have never been the focus of his research. In light of his lack of experience, “[i]t is paradoxical for Dr. Antognini who does not believe in analgesia as a component of anesthesia and who has never studied midazolam, to claim to be an expert who can testify about the analgesic effects of midazolam, and yet he did so”;
3. He opined on matters of pharmacology, pathology, and law, despite having no training or expertise;
4. He “has rejected the statements made in the Fourth, Fifth, Sixth, Seventh, and Eighth Edition[s] of *Miller’s Anesthesia*—the preeminent anesthesia textbook for decades—that benzodiazepines like midazolam have no analgesic properties,” and despite his

statements that the authority of textbooks should not overstated, “he has written his own textbook on anesthesia”;

5. “Dr. Antognini cited a 1985 study from Reves and Greenblatt concluding that midazolam cannot be used to maintain adequate anesthesia, which proves the unreliability of his contrary testimony”;
6. His citations to studies about induction of anesthesia and non-responsiveness to verbal commands or loss of eyelid reflex “do[] not support a conclusion that midazolam prevent[s] sensation of noxious stimuli such as those involved with Ohio’s execution protocol,” and in fact, the studies cited throughout his report are inapposite; and
7. His inconsistent testimony about the analgesic effects of midazolam make his overall testimony unreliable.

Id. at PageID 112742-45 (internal quotation marks and citations omitted).

Further, Jackson argues, Dr. Antognini’s report and expected testimony are unreliable because he does not reiterate, in his Summary of Opinions, his previous opinion that midazolam has analgesic properties, despite that being a point of emphasis in his previous testimony (Antognini Motion III, ECF No. 2318, PageID 1112745, citing Antognini Report, ECF No. 2291, PageID 111263-64). Similarly, his opinions regarding the intravenous administration of midazolam on humans; that the execution protocol allowed sufficient time for midazolam to induce unconsciousness before administration of the paralytic and potassium chloride; that midazolam does not have a ceiling effect; and that the consciousness checks conducted by execution Team Members were sufficient to ensure that an inmate was unconscious, were unsupported either by his actual expertise or the supporting sources upon which he purportedly relies. *Id.* at PageID 1112746-49 (citations omitted).

As to the current report, Jackson claims Dr. Antognini’s statements that midazolam is used to induce anesthesia, and can be used by itself for painful procedures, are irrelevant and do not support his conclusions that midazolam has analgesic properties, can produce unconsciousness,

and that unconsciousness is equivalent to insensation (Antognini Motion III, ECF No. 2318 PageID 112749-50, citing Antognini Report, ECF No. 2291, PageID 111264-65, ¶¶ 13-15). He argues that Dr. Antognini's opinions either do not address or are strongly contradicted by the majority of the best scientists in their fields, including but not limited to Henness's experts David J. Greenblatt, M.D.³, and David A. Lubarsky, M.D, namely that induction of anesthesia is different from actually maintaining a state of anesthesia, and that "even when someone is under anesthesia, noxious and/or painful stimuli stimulate the person, increasing a person's consciousness, awareness, and sensation." *Id.* at PageID 112750, citing Tr., ECF No. 2113, PageID 104264-326.

Further, Jackson claims that Dr. Antognini's opinions that midazolam has analgesic properties and that one must be awake to experience pain is contradicted by the scholarly consensus in those areas and by evidence of record in this case. Jackson emphasizes the previous testimony of his expert, Matthew C. Exline, M.D.: "'Unconscious' people (who cannot verbally respond to stimulus) feel pain which they manifest through nonverbal behaviors." *Id.* at PageID 112751, citing Tr., ECF No. 2113, PageID 104036-37. This includes people who suffer respiratory depression from overdoses of benzodiazepines, which are, as Dr. Greenblatt notes, not fatal by themselves. This pain is measured through the Critical Care Pain Observation Tool ("CPOT"), which Dr. Antognini has never used. *Id.* at PageID 112751-52, citing Tr., ECF No. 2113, PageID 104029-37; Tr., ECF No. 2120, PageID 104913. Finally, Jackson argues, Dr. Antognini's opinion that the overdose of midazolam in the protocol creates insensation ignores the ceiling effect of the drug, and his conflation of sedation and anesthesia has no basis in medical theory, scholarship, or practice. *Id.* at PageID 112753-54. Consequently, Jackson moves that Dr. Antognini's "opinions as expressed in Summary paragraphs a-e and ¶¶ 13-20 . . . not be admitted by this Court." *Id.* at

³ Dr. Greenblatt has also submitted reports and was scheduled to testify on behalf of Jackson (Jackson Witness List, ECF No. 2256, PageID 108247; Greenblatt Report, ECF No. 2258, Greenblatt Rebuttal, ECF No. 2334).

PageID 112754, citing Antognini Report, ECF No. 2291, PageID 111263-67, ¶¶ 13-20.

Jackson notes that in his report, Dr. Antognini “purports to define the term ‘sure or very likely’ as used in Eighth Amendment Decisions[,]” and moves that the paragraph containing that legal conclusion be struck for lack of expertise (Antognini Motion III, ECF No. 2318, PageID 112754-55, citing Antognini Report, ECF No. 2291, PageID 111267, ¶ 21; *Berry v. City of Detroit*, 25 F.3d 1342, 1353 (6th Cir. 1994); *Little Hocking Water Ass’n v. E.I. du Pont de Nemours & Co.*, 90 F. Supp. 3d 746, 766 (S.D. Ohio 2015) (Marbley, J.)). Further, Jackson argues, Dr. Antognini’s opinions regarding air hunger, apnea, and respiratory depression are either lacking in foundation (because he is not a pulmonologist) or bootstrapped, unexplained, and unsupported conclusions, and should be excluded on those grounds. *Id.* at PageID 112756, citing Antognini Report, ECF No. 2291, PageID 111269-70, ¶¶ 24-26. Jackson claims that Dr. Antognini’s current opinions, ostensibly based on published journal articles on midazolam, are in fact reiterations of his opinions that the Court rejected as unsupported in the Henness proceedings. He argues that the Court should do so again. *Id.* at PageID 112757-58, citing Antognini Report, ECF No. 2291, PageID 111273, ¶¶ 31-32; *see also Henness*, 2019 U.S. Dist. LEXIS 8200, at *224-25 (Court’s discounting of Dr. Antognini’s opinions).

Jackson claims that the portions of Dr. Antognini’s opinions challenging the reports of Jackson’s experts, Drs. Blanke, Edgar, Exline, and Greenblatt, should be stricken, since he has not conducted research on midazolam and has no expertise in the fields of critical pain management, pathology, pharmacology, or pulmonology (Antognini Motion III, ECF No. 2318, PageID 112759-60, citing Tr., ECF No. 2120, PageID 104913; Antognini Report, ECF No. 2291, PageID 111274-78, 111281, 111282 ¶¶ 35-40, 48, 50-53). Further, Jackson argues, the non-human animal studies Dr. Antognini relies upon are inapposite, because they cannot prove what does not exist—namely,

that midazolam has analgesic properties. *Id.* at PageID 112761, citing Antognini Report, ECF No. 2291, PageID 111278, ¶ 41. Finally, Dr. Antognini’s opinions regarding Donnie Johnson, in which he claims that Johnson’s “high-pitched vocalization upon being hit by the paralytic . . . does ‘not mean that the inmate is in pain[,]’” is “mere *ipse dixit*” according to Jackson, and “Dr. Antognini’s claim that Johnson did not suffer pulmonary edema is unreliable because it is absolutely wrong.” *Id.* at PageID 112762, citing Antognini Report, ECF No. 2291, PageID 111281-82, ¶¶ 49-50.

B. Motion to Exclude Dr. Edgar

Defendants argue that that Dr. Edgar’s autopsy of former Plaintiff Robert Van Hook, and his review of reports of autopsies conducted on other inmates, are insufficient to support his “theory that the acidic midazolam solution directly damages the cells in the lungs, which he says in turn, causes a horrific and terrifying feeling as the inmate struggles to breathe[.]” (Edgar Motion II, ECF No. 2314, PageID 112099). They claim that “Dr. Edgar’s theory seems to be based on nothing more but [sic] his own ideas about how the pulmonary edema develops – *he cites no scientific sources to support his theory other than an article that is nearly 100 years old⁴ about how inhaled chlorine gas causes pulmonary edema[.]*” *Id.* at PageID 112099-100 (emphasis in original). Consequently, Defendants argue, his theory is inapplicable to intravenous injection of midazolam and is not accepted by the scientific community, and his testimony should be excluded for those reasons. *Id.* at PageID 112100. They also argue that his lack of training in forensic pathology, and lack of experience performing autopsies on individuals who died from drug overdoses, mean that “his opinions [are] based on fundamental mistakes of anatomy and

⁴ The article is from a study at Yale about treatment of those subject to poison gas attacks during the First World War.

physiology.” *Id.*

Defendants raise four main arguments as to why Dr. Edgar’s reports and expected testimony fail to satisfy *Daubert* and Rule 702. *First*, they claim that because he is a neuropathologist, with a sub-specialty in bone and soft tissue, and not a pulmonologist or forensic pathologist, he has no qualifications to opine on whether overdoses of midazolam cause pulmonary edema (Edgar Motion II, ECF No. 2314, PageID 112102, citing Tr., ECF No. 2112, PageID 103829, 103833; Edgar Report, ECF No. 2257).⁵ Thus, they argue, Dr. Edgar’s “conclusion that pulmonary edema results in ‘serious, terrifying pain and suffering in the general population’ is nothing more than pure conjecture.” *Id.* at PageID 112103, quoting Edgar Henness Report, ECF No. 2035-1, PageID 99905, ¶ 75.⁶ Similarly, they claim, his conclusion “that an inmate given midazolam ‘would experience severe respiratory distress with associated sensations of drowning, asphyxiation, panic and terror’” is purely speculative. *Id.*, quoting Edgar Report, ECF No. 2035-1, PageID 99909, ¶ 87.

Second, Defendants argue that his opinions were prepared solely for the purpose of serving as an expert witness in *Abdur’Rahman v. Parker*, 558 S.W.3d 606 (Tenn. 2018), and the captioned case, and that this factor weighs against finding his opinions reliable under *Daubert* (Edgar Motion II, ECF No. 2314, PageID 112103-04, citing *Johnson v. Manitowoc Boom Trucks, Inc.*, 484 F.3d 426, 434 (6th Cir. 2007), quoting *Daubert v. Merrell Dow Pharm., Inc.*, 43 F.3d 1311, 1317 (9th Cir. 1995) (on remand from *Daubert*, 509 U.S. 579).

Third, Defendants claim that Dr. Edgar’s opinions are not based on proper scientific method; specifically, because there was no control group, he conflates correlation between

⁵ The pages cited in the Edgar Report by Defendants, PageID 108276-92, are outside the page range of the Report.

⁶ Defendants are citing to a copy of the Edgar Henness Report filed as an exhibit by Henness. It is identical to the Edgar Henness Report filed by Henness prior to the hearing at ECF No. 1950.

intravenous midazolam injection into inmates and those inmates thereafter suffering pulmonary edema with causation (Edgar Motion II, ECF No. 2314, PageID 112105). Moreover, Defendants argue that Dr. Edgar’s failure to account empirically for the dilution and buffering of the midazolam solution during circulation in the bloodstream renders unreliable his opinion that it is the acidic nature of the midazolam that causes pulmonary edema. *Id.* at PageID 112105-06, citing Edgar Henness Report, ECF No. 2035-1, PageID 99903.

Fourth, Defendants claim that Dr. Edgar’s opinion that pulmonary edema caused by midazolam is “non-cardiogenic” is unreliable because “only scientific support cited by Dr. Edgar was written *nearly 100 years ago* about the use of lethal gases in World War I[,] . . . [and] to state the obvious, the mechanism of death by chlorine gas is radically different than [sic] the mechanism of death by lethal injection.” (Edgar Motion II, ECF No. 2314, PageID 112106 (emphasis in original)). Thus, his opinion that midazolam injures the lungs at all—much less that it causes non-cardiogenic pulmonary edema—is “not supported by even a scintilla of scientific evidence[,]” and thus is inadmissible pursuant to *Daubert* and Rule 702. *Id.* at PageID 112107.

LEGAL STANDARDS

Federal Rule of Evidence 702 sets forth the requirements for the admissibility of expert testimony as follows:

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

(a) the expert’s scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;

- (b) the testimony is based on sufficient facts or data;
- (c) the testimony is the product of reliable principles and methods;
and
- (d) the expert has reliably applied the principles and methods to the facts of the case.

The wording of the rule reflects the now-standard inquiry set out in *Daubert*, 509 U.S. 579 (1993), which is the basis on which the Court must analyze the expert testimony offered in this case.⁷ See, e.g., *Nelson v. Tenn. Gas Pipeline Co.*, 243 F.3d 244, 250 n.4 (6th Cir. 2001). Under Rule 702, as interpreted in *Daubert*, the trial judge must exercise a “gatekeeping” function and “ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable.” *Daubert*, 509 U.S. at 589. “[I]n order to qualify as ‘scientific knowledge,’ an inference or assertion must be derived by the scientific method.” *Id.* at 590. In a case involving scientific evidence, evidentiary reliability will be based on scientific validity. *Id.* at n.9. Factors bearing on whether reasoning is scientifically valid include: can the theory or technique be tested; has it been subjected to peer review and publication, what is the known or potential rate of error, has it been generally accepted? *Id.* at 593-594 (citations omitted), see also *United States v. Beverly*, 369 F.3d 516 (6th Cir. 2004) (Boggs, J.).

The United States Court of Appeals for the Sixth Circuit required a trial judge to take a hard look at scientific evidence even before *Daubert*. *Turpin v. Merrell Dow Pharms., Inc.*, 959 F.2d 1349, 1352 (6th Cir. 1992) (cited favorably in *Daubert*, 509 U.S. at 596). Expert testimony based on scientific research done solely for litigation that is neither subjected to peer review nor published in scientific journals and is not accompanied by showing of methodology on which it is

⁷ Although the language of Rule 702 has been changed since *Daubert*, “[t]hese changes are intended to be stylistic only. There is no intent to change any result in any ruling on evidence admissibility.” Fed.R.Evid. 702 Cmte. Note on Rules (2011).

based is not admissible under Rule 702. *Johnson*, 484 F.3d 426, 434-35 (6th Cir. 2007), citing *Daubert*, 43 F.3d at 1317-18.

Therefore, the Court reviews this case under *Daubert*, which set forth a non-exclusive checklist of factors for trial courts to use in assessing the reliability of proffered scientific expert testimony. These include 1) whether the expert's scientific technique or theory can be, or has been, tested; 2) whether the technique or theory has been subject to peer review and publication; 3) the known or potential rate of error of the technique or theory when applied; 4) the existence and maintenance of standards and controls; and 5) whether the technique or theory has been generally accepted in the scientific community. *Daubert*, 509 U.S. at 592-95; *United States v. Beverly*, 369 F.3d 516 (6th Cir. 2004) (Boggs, J.); *Hardyman v. Norfolk & W. Ry.*, 243 F.3d 255, 260 (6th Cir. 2001). If the evidence is deemed to be reliable and relevant, the judge must then determine if the probative value of the evidence is outweighed by its prejudicial effect. *Daubert*, 509 U.S. at 595, citing Fed.R.Evid. 403.

Analysis

This Court heard testimony from Dr. Antognini on September 9, 2019, and from Dr. Edgar on September 10, 2019. It heard oral argument on the Motions on September 11. After careful consideration of that testimony, the parties' briefing, the requirements of Rule 702, and the factors set forth in *Daubert*, the Court concludes that both Drs. Antognini and Edgar are acceptable expert witnesses. The Court briefly analyzes their qualifications under those requirements below:

A. *Daubert* Factors

The Court notes, at the outset, several of the traditional *Daubert* factors are of limited value, due to the unique issues presented by the subject matter of the litigation. The impact of intravenous injection of a human being with 500 mg of midazolam cannot be tested in a laboratory study. At least some witnesses have testified in prior hearings that such a dose would likely be fatal. All experts in prior hearings to whom the question has been put agree such a study would be unethical and unlikely to be approved by the relevant authorities. For the same reason, there cannot be a “control group” as would commonly occur in a double-blind pharmaceutical study, and the concept of an error rate is complicated by the uncertainty of what is actually being measured.

As to peer review and publication, Dr. Edgar testified that he, Dr. Lubarsky, and Joel Zivot, M.D., have drafted a manuscript of an article for publication regarding the overdose of midazolam as the cause of pulmonary edema in inmates, but that he has not yet submitted it for consideration (9-10-19 Rough, p. 166). Dr. Antognini testified that he has never conducted research or published any papers on midazolam (9-9-19 Rough, p. 26); however, he has written a textbook on anesthesia (*Curriculum vitae*, ECF No. 2291, PageID 111293, citing JOSEPH F. ANTOGNINI ET AL., NEURAL MECHANISMS OF ANESTHESIA (Humana Press 2002)). Given the novelty of three-drug lethal injections using midazolam⁸, the lack of publication does not weigh against Dr. Edgar’s testifying, and indeed, that he has written a manuscript intended for publication underscores the intended rigor of his research on the topic. Meanwhile, Dr. Antognini’s extensive research and publication in the field of anesthesia (*see generally Curriculum vitae*, ECF No. 2291, PageID 111293-111311)

⁸ At the Court’s request, the parties have prepared a chronology of midazolam-initiated three drug executions (See ECF No. 2469-35, PageID 127272). It appears from that chart that the first such execution was of William Happ on October 15, 2013.

and use of midazolam in the practice of anesthesia weigh in favor of accepting his report and allowing his testimony.

Much was made at the *Daubert* hearing of the fact that Dr. Antognini's theory that midazolam has analgesic properties at large doses is belied by the preeminent textbook in the field of anesthesiology, *Miller's Anesthesia* (9-9-19 Rough, pp. 68-89). Further, through cross-examination, it was revealed that Dr. Antognini's exclusion of insensation from his criteria for anesthesia is contradicted by Dr. Lubarsky who testified in this consolidated case on behalf of Plaintiff Warren Henness (9-9-19 Rough, pp. 113-14). However, the issue of whether midazolam can induce analgesia at any dose, or the extent to which it can suppress consciousness, is no longer properly before the Court in light of the Sixth Circuit's decision in *Henness*, 2019 U.S. App. LEXIS 27365⁹, and even if those aspects of Dr. Antognini's opinions have been rejected by the scientific community, that rejection is not reason to exclude him from testifying.

B. Rule 702 Elements

1. Helpful Scientific, Technical, or Other Specialized Knowledge

Dr. Antognini has been a board-certified anesthesiologist since 1989, during which time he has administered midazolam to patients more than 1,000 times (9-9-19 Rough p. 26). He served as a professor of anesthesiology at the University of California, Davis, School of Medicine for almost twenty-five years, and now serves as a surveyor for the Joint Commission (*Curriculum*

⁹ Plaintiffs have argued that the *Henness* decision is not binding because it is not final in the sense that it may be reversed by the Sixth Circuit *en banc* or the Supreme Court and that no mandate has yet issued. For reasons already given in the Decision and Order Vacating Evidentiary Hearing (ECF No. 2507), the Court regards itself as bound by *Henness*.

vitae, ECF No. 2291, PageID 111288-89), which inspects hospitals for accreditation purposes (9-9-19 Rough, pp. 7-8). Dr. Antognini testified that physiology and pharmacology are the backbones of anesthesiology, and within that latter field, the subfields of pharmacokinetics—absorption, dilution, or anything the body does to the drug—and pharmacodynamics—sedation, amnesia, anxiolysis, or anything the drug does to the body—must be considered in any induction or maintenance of anesthesia. Moreover, he was responsible for drafting questions for Board certification from 1998 to 2001, during which time he tested Board applicants on the above, and specifically as to the pharmacokinetics and pharmacodynamics of benzodiazepines (9-9-19 Rough, pp. 22-23). Dr. Antognini’s experience both clinically and academically with benzodiazepines provide him with sufficient scientific knowledge to assist the Court in making findings of fact regarding midazolam. To the extent Dr. Antognini renders any legal opinions in his report, the Court finds they are beyond his expertise and they will not be considered.

Dr. Edgar is an associate professor of pathology at Emory University School of Medicine, a Board-certified anatomic pathologist (*Curriculum vitae*, ECF No. 2257, PageID 108276). Additionally, he is the Director of the Emory Pathology Expert Consultation Service. *Id.* In that role, he provides a second opinion for pathologists in complex cases that may require ancillary testing, along with resolving disputes among pathologists who differ on diagnosis and classification of difficult tumors (9-10-19 Rough, pp. 3-5). He has performed over 500 autopsies, and in each of them, he identified a cause of death and prepared an autopsy report (9-10-19 Rough, pp. 9-11). Dr. Edgar testified that he has been learning about pulmonary edema, which is found in between twenty and forty percent of all autopsies, since medical school, and while in internship and residency, he treated patients suffering from pulmonary edema. He continues to teach resident pathologists about pulmonary edema, identifying its signs, and differentiating between cardiogenic

and non-cardiogenic pulmonary edema (9-10-19 Rough, pp. 9-10, 18). As identification of pulmonary edema, and the differences between cardiogenic and non-cardiogenic pulmonary edema, may be pertinent to the Court's eventual factual findings, at least under Plaintiff's reading of *Hennes*, Dr. Edgar's experience and background render him well-qualified to assist the Court in making those findings.

2. Sufficient basis in facts or data

In his expert report, Dr. Antognini provided a summary of his seven main opinions (ECF No. 2291, PageID 111263-64, ¶ 12a-g), and thereafter, he cited a variety of scholarly articles, the United States Food and Drug Administration ("FDA") package insert for midazolam, and book chapters, including ones authored by Dr. Lubarsky, or from *Miller's Anesthesia*, in support. *Id.* at PageID 111264-74, ¶¶ 13-33. In the paragraphs discussing his disagreement with the initial reports of Plaintiffs' experts Charles David Blanke, M.D., Matthew Exline, M.D., David J. Greenblatt, M.D., Craig W. Stevens, Ph.D., Dr. Edgar, and Dr. Lubarsky, Dr. Antognini cited published studies that explained his disagreement with their opinions. *Id.* at PageID 111274-77, ¶¶ 34-37, 39-40.¹⁰ He also reviewed the autopsy reports of inmates executed with midazolam. *Id.* at PageID 111274, ¶ 38. Finally, during his testimony at the *Daubert* hearing, in his recitation of his summary opinions, Dr. Antognini recited the sources supporting each of those opinions (*See generally* 9-9-19 Rough, pp. 45). From his testimony and report (References Cited, ECF No. 2291, PageID 111284-86), including his list of materials considered, it is apparent that Dr. Antognini has conducted an adequate review of the existing literature and the evidence.

¹⁰ The Court's statement speaks only to the Dr. Antognini's efforts to support his opinions in those paragraphs to scholarly sources, not to the validity of the opinions themselves. .

Dr. Edgar's conclusions regarding midazolam as the cause of pulmonary edema are supported by his conducting of an autopsy on Robert Van Hook and his review of the autopsy reports of at least thirty-one other inmates who were executed using midazolam (Expert Report, ECF No. 2257, PageID 108272, ¶ 31; Supp. Report, ECF No. 2360-1, PageID 114534, ¶¶ 9-11). Dr. Edgar's dataset shows that he has analyzed almost every execution since 2013 in which midazolam was used and for which an autopsy report was created (Supp. Report, ECF No. 2360-1, PageID 114536-41). It is hard to imagine a better set of data from which an expert could draw conclusions; accordingly, Dr. Edgar has a sufficient factual basis upon which to draw reliable conclusions.

3. Reliable principles, methodology, and application

In his testimony, Dr. Edgar cogently set forth his process of differential diagnosis by which he identified midazolam as the likely cause of pulmonary edema in inmates injected with midazolam (9-10-19 Rough, pp. 129-30, 133). Differential diagnosis is a well-accepted medical technique¹¹ (9-10-19 Rough, pp. 146-47), and any issues as to the conclusions he drew using that methodology goes to the weight to which the evidence should be accorded, and is not a reason to exclude him under Rule 702 and *Daubert*.

In his Motion, Cleveland Jackson asserts that, in seven areas, Dr. Antognini has failed to show that his conclusions are the product of reliable principles (ECF No. 2318, PageID 112733-

¹¹ Differential diagnosis is considered to be "a standard scientific technique of identifying the cause of a medical problem by eliminating the probable causes until the most probable one is isolated." *Best v. Lowe's Home Centers, Inc.*, 563 F.3d 171, 178 (6th Cir. 2009), *quoting Hardyman v. Norfolk & W. Ry. Co.*, 243 F.3d 255, 260 (6th Cir. 2001). "[A] medical opinion on causation based upon a reliable differential diagnosis is sufficiently valid to satisfy the first prong [reliability] of the Rule 702 inquiry." *Id.*, *quoting Westberry v. Gislaved Gummi AB*, 178 F.3d 257, 263 (4th Cir. 1999).

34). *First*, he argues that Dr. Antognini’s opinion that “midazolam can be used to establish anesthesia in lethal injection is scientifically unreliable and inadmissible.” *Id.* at PageID 112749. While Defendants argue that “Dr. Antognini’s opinion does not say that[.]” (Memo. in Opp., ECF No. 2343, PageID 114342), the recent published decision in *Hennes* holds that any dispute as to whether midazolam has analgesic properties or can anesthetize an inmate is immaterial as to whether the inmate can meet the first prong of *Glossip v. Gross*, 135 S.Ct. 2726 (2015). *Hennes*, 2019 U.S. App. LEXIS 27365, at *5-7. Thus, even assuming that opinion is unreliable, it is irrelevant to the Court’s determination as to whether Dr. Antognini should be allowed to testify.

Second, Jackson asserts that Dr. Antognini’s opinion on “[t]he term ‘sure or very likely’ . . . used in court opinions” (Antognini Report, ECF No. 2291, PageID 111267, ¶ 21) is an improper attempt to define a legal term of art and struck accordingly (Antognini Motion III, ECF No. 2318, PageID 112754-55). However, the Court agrees with Defendants that Dr. Antognini was defining those terms in the context of his analysis of the United States Food and Drug Administration’s (“FDA”) approval of midazolam to induce anesthesia (Memo. in Opp., ECF No. 2343, PageID 114342). As an anesthesiologist who has used midazolam and anesthetic drugs numerous times, he is qualified to opine on “sure or very likely” in that narrow context.

Third, Jackson argues that Dr. Antognini “provides unreliable assertions about consciousness checks here. They should be excluded.” (Antognini Motion III, ECF No. 2318, PageID 112755). He claims that Dr. Antognini “fails to acknowledge that a person who is unconscious may experience pain[.]” *Id.* In light of the *Hennes* decision, analgesia is no longer a relevant consideration, and Dr. Antognini’s reliance upon the practice advisory of the American Society of Anesthesiologists, which “includes clinical signs (including verbal, eyelash and noxious stimuli) as ways to assess consciousness” (Antognini Report, ECF No. 2291, PageID 111268, ¶

23), is not so unreasonable as to exclude his testimony.

Fourth, Jackson claims that because Dr. Antognini is not a pulmonologist, his opinions on “air hunger, apnea[,] and respiratory depression” lack any reliable basis (Antognini Motion III, ECF No. 2318, PageID 112756). However, Dr. Antognini relies on peer-reviewed articles and his experience as an anesthesiologist—where maintaining respiration is a crucial component—in making logical inferences from those articles and studies (Antognini Report, ECF No. 2291, PageID 111269-70, ¶¶ 24-26).

Fifth, Jackson argues that “Dr. Antognini’s opinions about midazolam establishing analgesia and the Gerke and Miyaki studies are also unreliable and inadmissible under *Daubert*.” (Antognini Motion III, ECF No. 2318, PageID 112757). Again, whether midazolam can induce analgesia is no longer by itself relevant in determining whether Jackson can meet the first prong of *Glossip*, and is not a reason to exclude Dr. Antognini.

Sixth, Jackson claims that Dr. Antognini’s criticisms of the opinions of Jackson’s experts contain opinions on matters of pharmacology and pathology, sub-fields of which he is not an expert, and his extrapolation from animal studies renders his opinions unreliable (Antognini Motion III, ECF No. 2318, PageID 112759-61). Dr. Antognini’s use of animal studies to extrapolate to humans does not render his opinions unreliable, as he testified that such extrapolation is common practice within the scientific community (9-9-19 Rough, pp. 208-09). Indeed, several of the experts in this case have cited animal studies in their reports, and Craig W. Stevens, Ph.D., during his testimony on behalf of Plaintiff Warren Henness, discussed a “hot plate” experiment he had conducted with animals. *Henness*, 2019 U.S. Dist. LEXIS 8200, at *172-73. However, in many parts of Dr. Antognini’s Report in which he discusses the reports of Jackson’s experts (*see generally* ECF No. 2291, PageID 111274-77, ¶¶ 34-40), he fails to explain how his

experience as an anesthesiologist allows him to opine on other subject matters. Thus, to the extent that those opinions are unsupported by reference to peer-reviewed articles or studies, the Court will not consider them.

Seventh, Jackson argues that Dr. Antognini's opinions are unreliable regarding whether the movements and verbal expressions made by inmates during their executions are expressions of pain (Antognini Motion III, ECF No. 2318, PageID 112762). As the Sixth Circuit has concluded that inmates injected with Ohio's three-drug protocol do not suffer "constitutionally inappropriate" pain, *Heness*, ___ F.3d ___, 2019 U.S. App. LEXIS 27365 at *5-6, whether the movements are actually indicia of pain is immaterial to the Court's analysis. Thus, Dr. Antognini's opinions on these matters are not reason to strike his report or exclude his testimony.

CONCLUSION

For the reasons set forth above, the Motion *In Limine* to Exclude and/or Limit the Testimony of Dr. Joseph Antognini (ECF No. 2318) and the Motion *In Limine* to Exclude the Testimony of Dr. Edgar (ECF No. 2314) are DENIED. The entirety of their expert reports will be considered by the Court except as expressly set forth above. For reasons previously given at ECF No. 2507, the Court will not be receiving oral testimony from these two expert witnesses.

September 19, 2019.

s/ ***Michael R. Merz***
United States Magistrate Judge